

WHAT IS CLAIMED IS:

1. An optical disc substrate comprising:  
a pit area having pits deep in depth;  
a groove area having grooves shallow in depth; and  
a land pre-pit provided between the grooves in one substrate,  
wherein a depth of a section of one groove allocated inside the land pre-pit in the radial direction is shallower than each depth of grooves surrounding the section of the groove, and wherein a center of the land pre-pit is shifted to the inner circumference direction with respect to the radial direction.
2. The optical disc substrate in accordance with claim 1, the optical disc substrate is further characterized by " $0.2 \text{ tp} < \text{Llpp} < \text{tp}$ " and " $0.5 \text{ Llpp} < \text{Lg} < 2 \text{ Llpp}$ ", wherein it is defined that a length of the section of the groove in the track direction, a length of the land pre-pit in the track direction, a track pitch and a width of the land are "Lg", "Llpp", "tp" and "Lw" respectively, and furthermore characterized in that a center position of the land pre-pit is within a range of " $-0.75 \times \text{Lw}/2 < (\text{center position of the land pre-pit}) < 0$ ", wherein it is defined that a center of the land is "0" (zero) and the inner circumference direction is "-" (minus) with respect to the radial direction.
3. The optical disc substrate in accordance with claim 1, wherein each of the pits and the grooves and the land pre-pit has approximately a trapezoidal cross-sectional shape.

4. A manufacturing method of an optical disc master for manufacturing a glass made optical disc master comprising a pit area having pits deep in depth, a groove area having grooves shallow in depth and a land pre-pit provided between the grooves, the manufacturing method comprising steps of:

coating photoresist on a glass substrate;

forming a pit section by irradiating on the pit area a laser beam having a first power exposing the photoresist as deep as a surface of the glass substrate;

forming a groove section shallow in depth by irradiating on the groove area a laser beam having a second power lower than the first power so as not to reach to the surface of the glass substrate; and

forming a land pre-pit section on a land existing between the groove section at a position displaced from a centerline of the land by a predetermined amount in the radial direction by irradiating the laser beam having the second power, wherein the laser beam having the second power is changed over to a third power lower than the second power while forming the groove section adjacent to the land pre-pit section,

the manufacturing method further comprising steps of:

etching only the pit section as deep as a predetermined depth through a plasma etching process;

ashing the photoresist as far as a bottom of the land pre-pit reaches to the surface of the glass substrate through an ashing process;

forming the pits, the grooves and the land pre-pit by etching the pit section, the groove section and the land pre-pit section so

as to become respective predetermined depths through the plasma etching process; and

removing the photoresist through the ashing process.

5. The optical disc substrate in accordance with claim 4, wherein each of the pits and the grooves and the land pre-pit has approximately a trapezoidal cross-sectional shape.

6. An optical disc substrate comprising:

a first pit area having pits deep in depth;

a second pit area having pits shallow in depth;

a groove area having grooves shallow in depth; and

a land pre-pit provided between the pits shallow in depth in one substrate, wherein a depth of a section of one pit allocated inside the land pre-pit in the radial direction is shallower than each depth of pits surrounding the section of the pit, and wherein a center of the land pre-pit is shifted to the inner circumference direction with respect to the radial direction.

7. The optical disc substrate in accordance with claim 4, the optical disc substrate is further characterized by " $0.2 \text{ tp}' < \text{Llpp}' < \text{tp}$ " and " $0.5 \text{ Llpp}' < \text{Lg}' < 2 \text{ Llpp}$ ", wherein it is defined that a length of the section of the pit in the track direction, a length of the land pre-pit in the track direction, a track pitch and a width of the land are " $\text{Lg}$ ", " $\text{Llpp}$ ", " $\text{tp}$ " and " $\text{Lw}$ " respectively, and furthermore characterized in that a center position of the land pre-pit is within a range of " $-0.75 \times \text{Lw}'/2 < (\text{center position of the land pre-pit}) < 0$ ", wherein it is defined that a center of the

land is "0" (zero) and the inner circumference direction is "--" (minus) with respect to the radial direction.

8. The optical disc substrate in accordance with claim 6, wherein each of the pits and the grooves and the land pre-pit has approximately a trapezoidal cross-sectional shape.

9. A manufacturing method of an optical disc master for manufacturing a glass made optical disc master comprising a first pit area having deep pits, a second pit area having shallow pits, a groove area having shallow grooves and a land pre-pit provided between the shallow pits, the manufacturing method comprising steps of:

coating photoresist on a glass substrate;

forming a deep pit section by irradiating on the first pit area a laser beam having a first power exposing the photoresist as deep as a surface of the glass substrate;

forming a shallow pit section by irradiating on the second pit area a laser beam having a second power lower than the first power so as not to reach to the surface of the glass substrate; and

forming a land pre-pit section on a land existing between the shallow pit section at a position displaced from a centerline of the land by a predetermined amount in the radial direction by irradiating the laser beam having the second power, wherein the laser beam having the second power is changed over to a third power lower than the second power while forming the shallow pit section adjacent to the land pre-pit section, the manufacturing method further comprising steps of:

etching only the deep pit section as deep as a predetermined depth through a plasma etching process;

ashing the photoresist as far as a bottom of the land pre-pit reaches to the surface of the glass substrate through an ashing process;

forming the grooves, the shallow pits, the deep pits and the land pre-pit by etching the groove section, the shallow pit section, the deep pit section and the land pre-pit section so as to become respective predetermined depths through the plasma etching process; and

removing the photoresist through the ashing process.

10. The optical disc substrate in accordance with claim 9, wherein each of the pits and the grooves and the land pre-pit has approximately a trapezoidal cross-sectional shape.

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